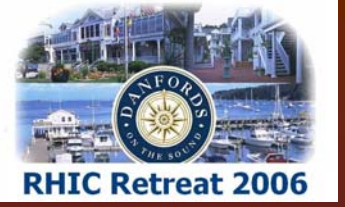
Availability: goals and plans

Fulvia Pilat



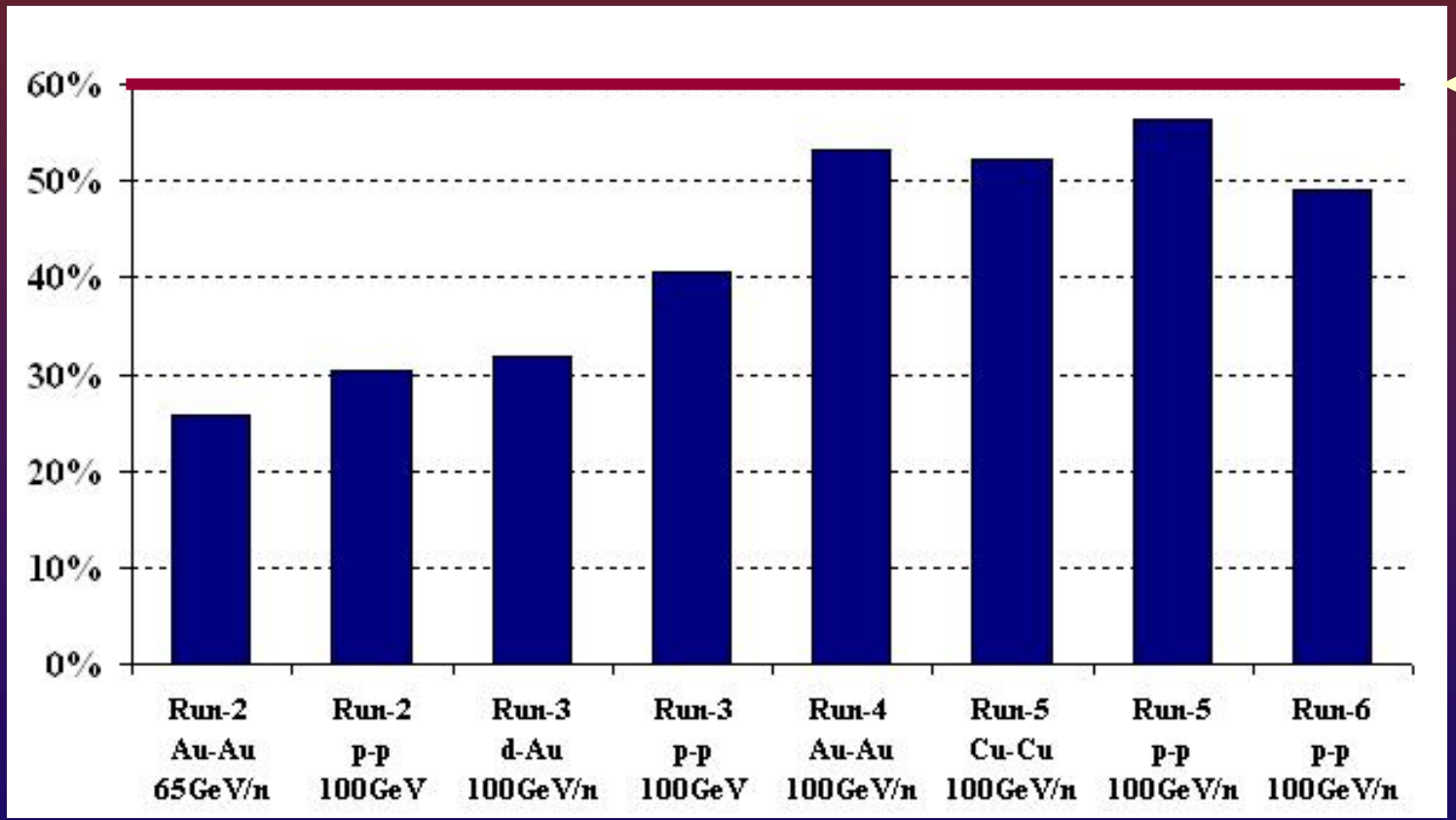
Outline

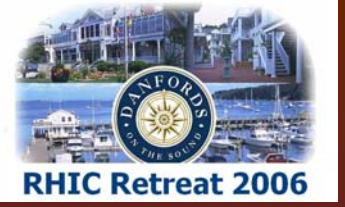
- RHIC Availability Goals
- Present status (→more in Peter's talk)
- Operations time breakdown
- Factors determining availability
- Ways to increase overall availability at RHIC (goal of this session)
- After the Retreat

RHIC Retreat 2006

Availability goal

- 60% time at store or ~100h / week





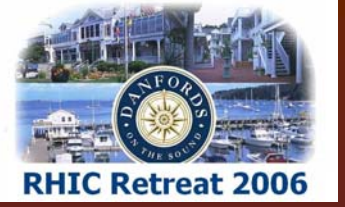
Availability goals and status

- HE machines (Hera, LEP, Tevatron) typically reach ~60% availability after 4-5 of operations

  (*attention to the different accounting: usually other machine exclude development and study time, and scheduled maintenance. Sometimes set-up time is excluded)*

  RHIC defines “time at store” (=after set-up) vs. calendar time
- Availability in Run-6 decreased from Run-5 and 4

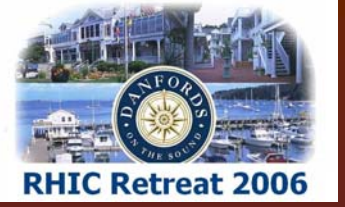
  48%,(less if we include the week we stopped operations)



Operation time breakdown

(rounded up for “average” ion ops)

- Physics running ~50%
- Injection, ramping, tuning ~20%
- Development ~5%
- APEX ~5%
- Maintenance, accesses ~5%
- Failure hours ~15%

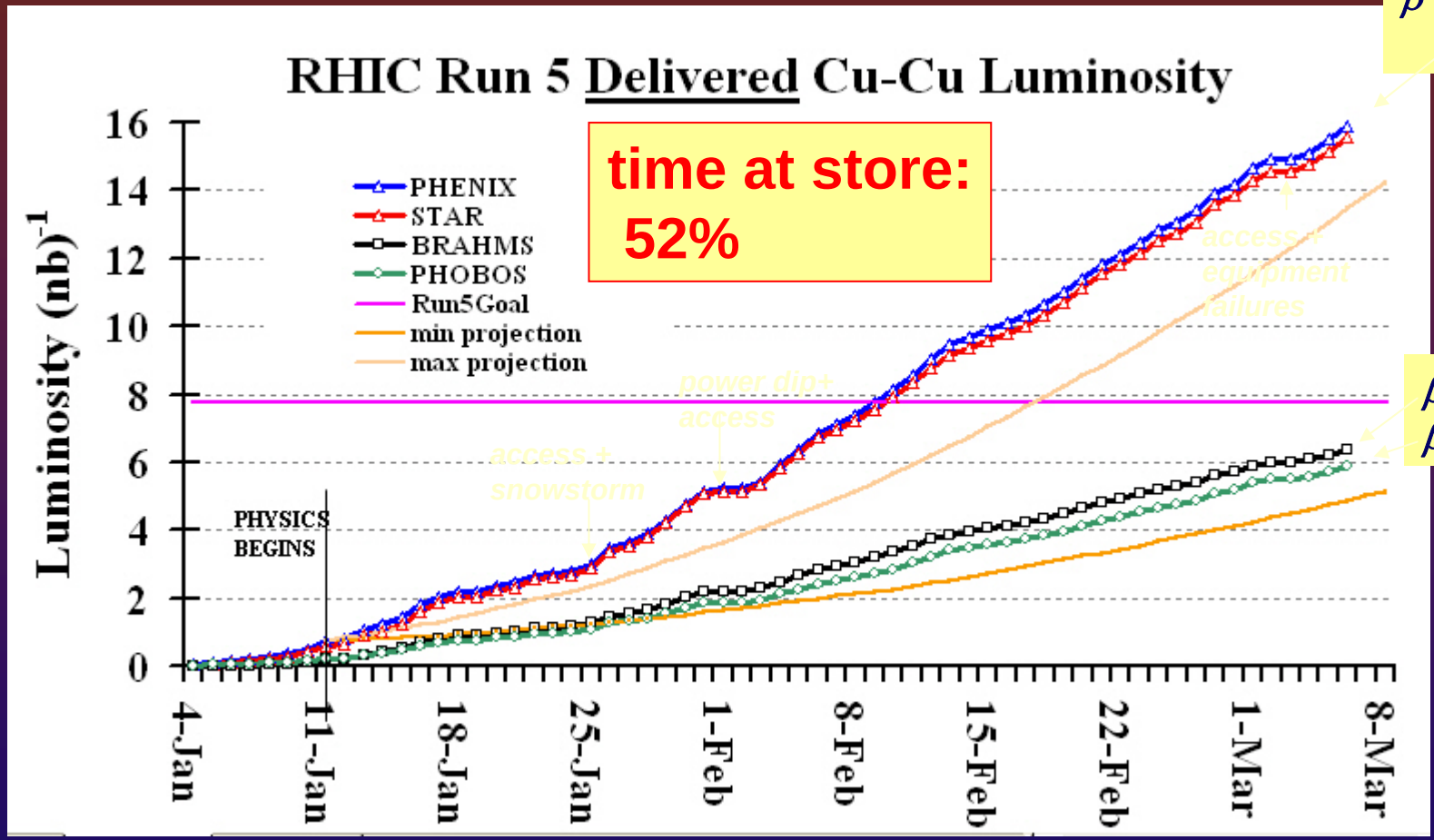


Factors affecting availability

- System reliability (unscheduled failure time)
- Recovery from system failure
- Legacy systems (AGS and injectors), design choices (example: RHIC magnets and power supplies)
- Machine tuning procedures
- Recovery after maintenance, access, etc.
- “Other” factors: power, weather, accidents,..
- Machine running mode, parameters
- Human performance

RHIC Retreat 2006

Cu Run-5 high-energy run

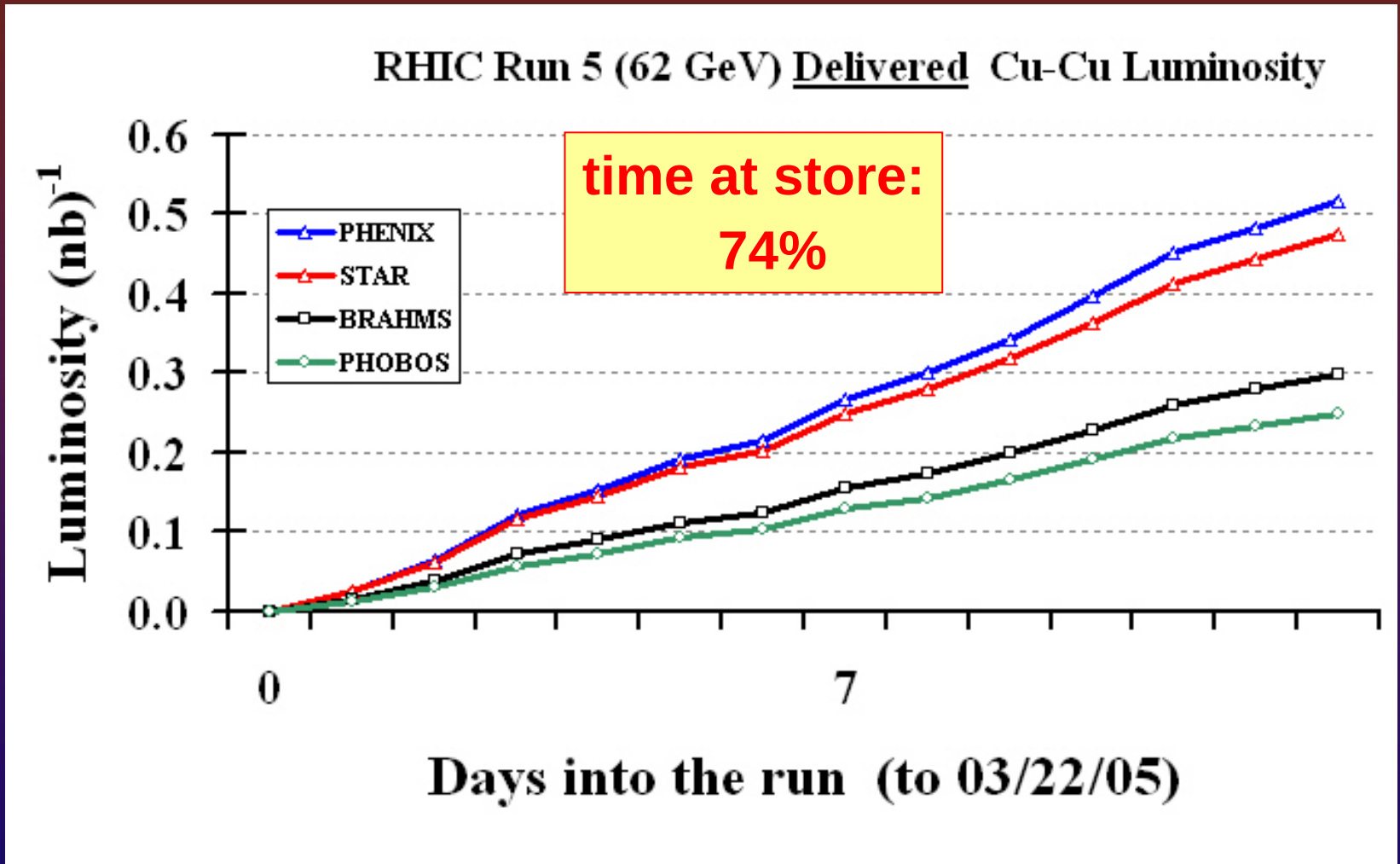


β^*=0.85m
(0.89m)

β^*=2.6m
β^*=3.0m

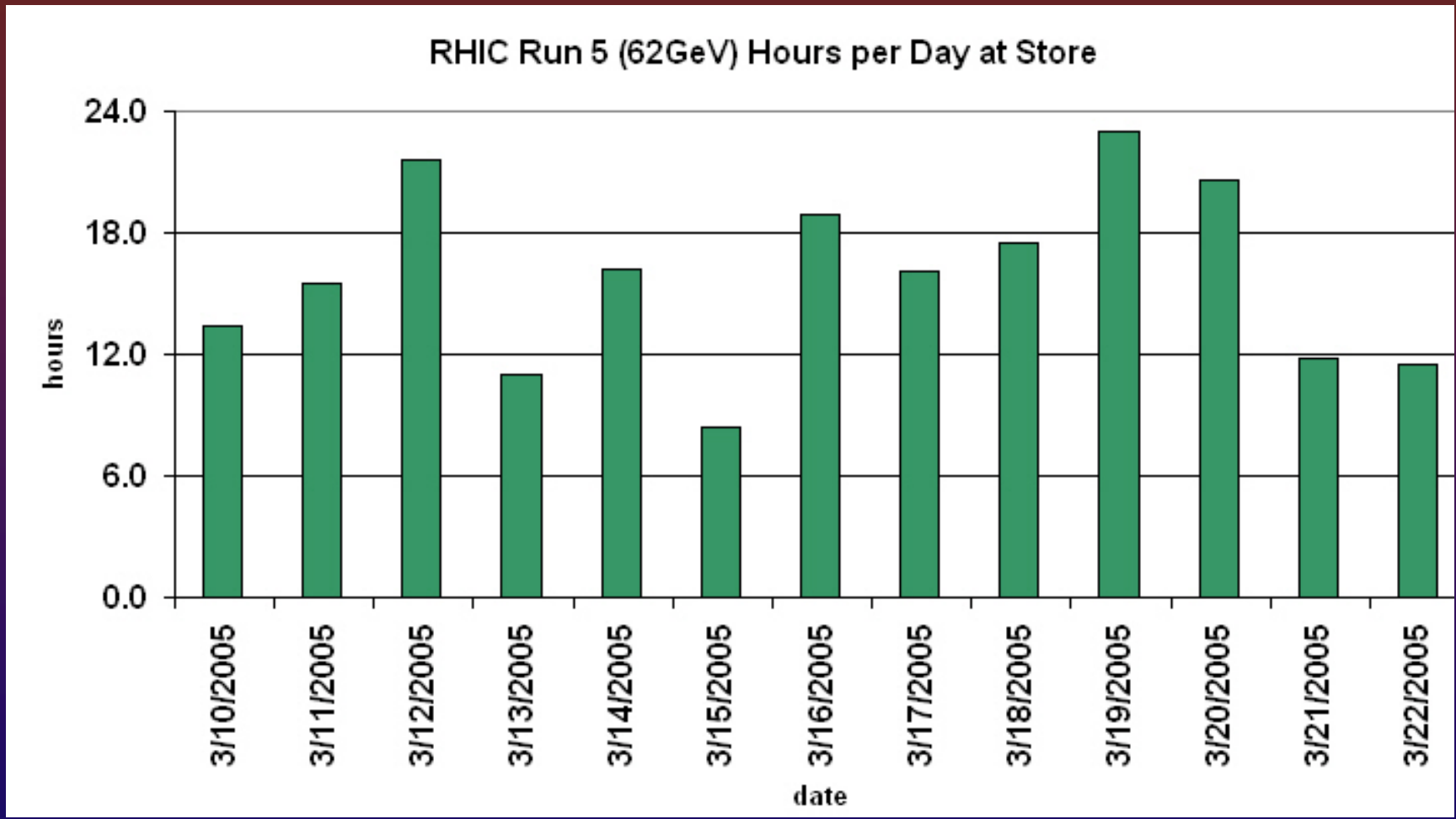
RHIC Retreat 2006

Cu Run-5 low energy run



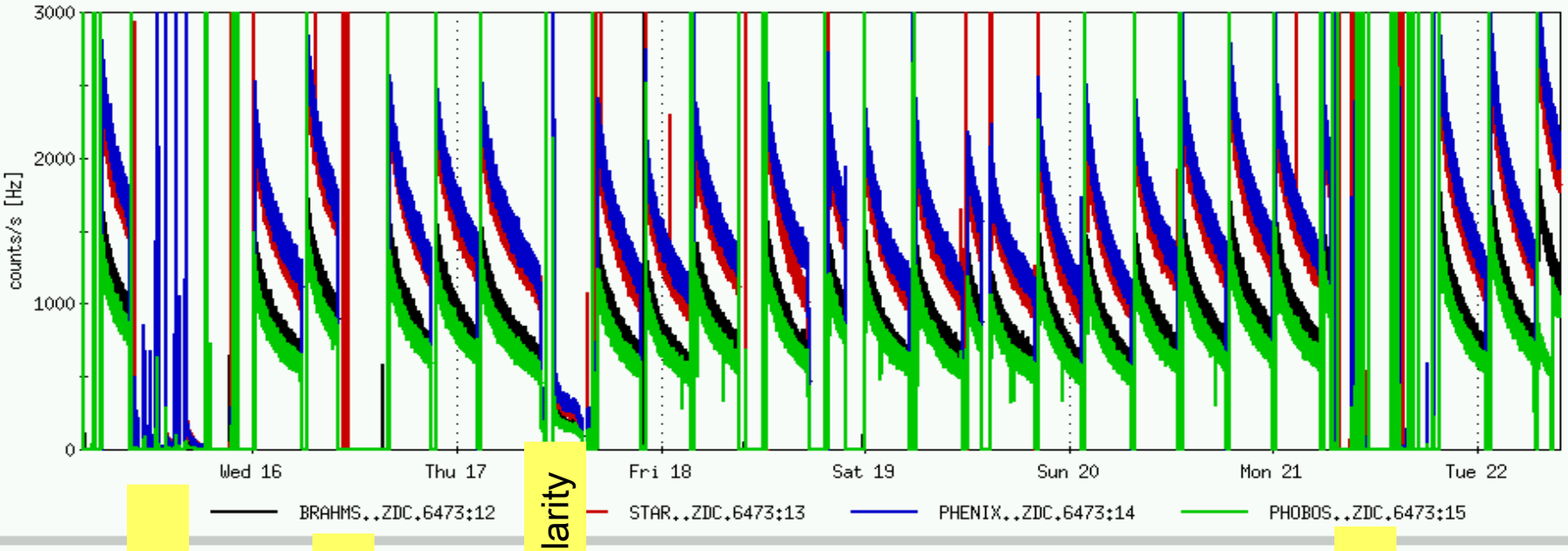
RHIC Retreat 2006

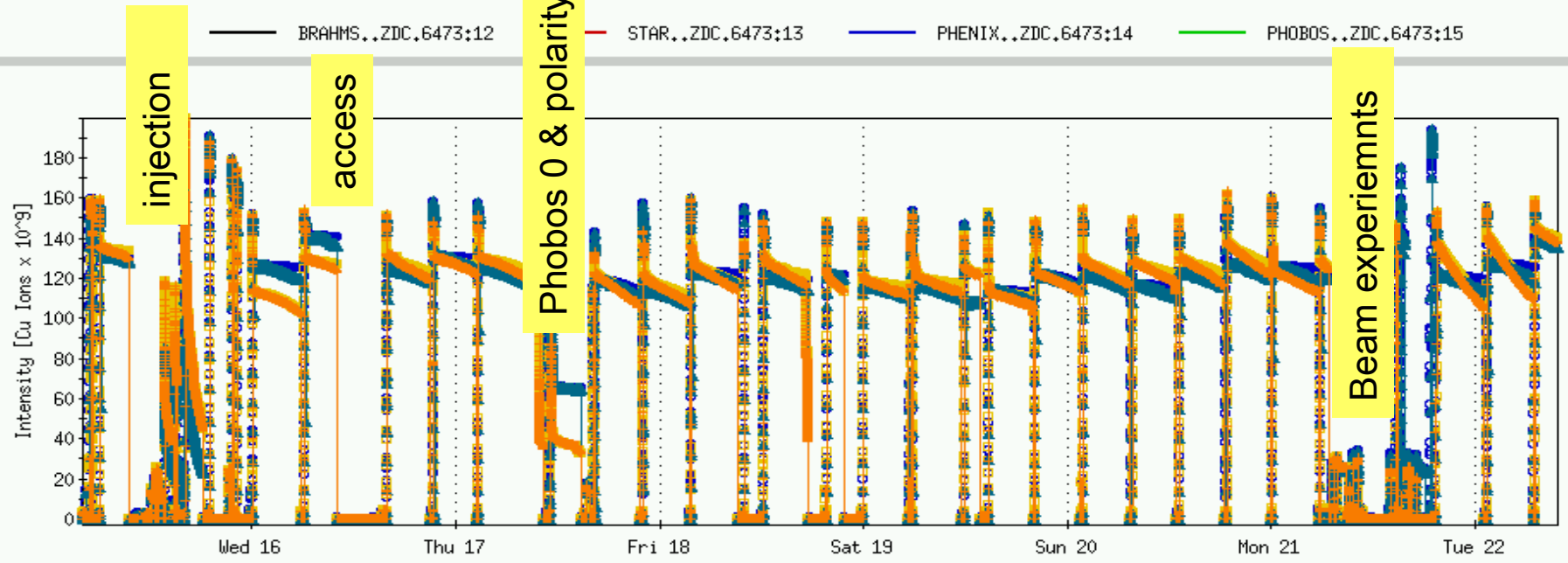
Hours at store – Cu Run-5 LE

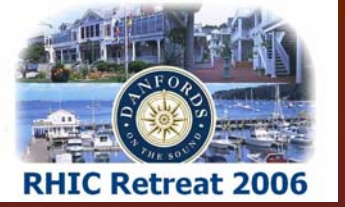


RHIC Retreat 2006

Cu Run-5 LE (week 2 - stores)







Low energy run - Cu

2 weeks of physics: choice to limit set-up time

Machine parameters

(almost the same #bunches 37-41, transmission HE~95%, LE ~ 85-92 %, same transition set-up)

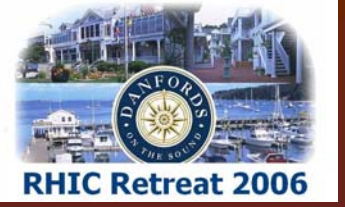
- **bunch intensity**: HE 41x 4.5e9 LE: 37x3.8e9
- **beta*** HE: 0.85m LE: 3m
- **energy** HE: 100 GeV/u LE: 31.2 GeV/u

→Reproducibility: minimized time tuning time

→Minimized time between stores

→ Longer lumi-lifetime

- *Possible to run at high availability*
- *3 weeks in Run-6 pp exceeded the 100h/week at store*



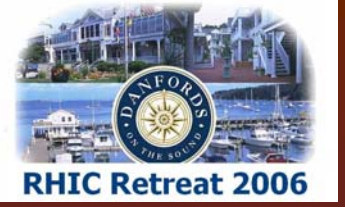
Increasing availability - 0

Running for availability

("factory" concept):

- Run parameters necessary to fulfill goals
- Refrain from unnecessary developments (time consuming)

Advocate this for Run-7 Au-Au operations

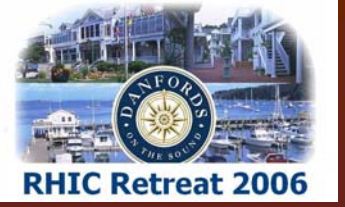


Increasing availability - 1

System reliability

- Memo March 06 → initial analysis of factors affecting individual system reliability + discussion of improvements
- Discussion and plans for individual systems at the Retreat
- Review of proposals during/after the Retreat to identify the most effective improvements across the systems (cost) and implementation plan (schedule)

→ *All system talks this session*

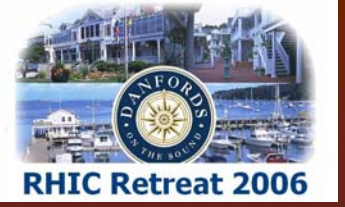


Increasing availability - 2

Maintenance and access

- Reduction frequency of maintenance 2→3 weeks
- Optimization of maintenance scheduling and coordination, respectively by WEB based job requests and schedules, and the creation of an overall maintenance coordinator
- Optimization of operation recovery time after maintenance (formal scheduling of system testing after repair, formal hand-over of systems to operations)

→*Talk by Paul this session*

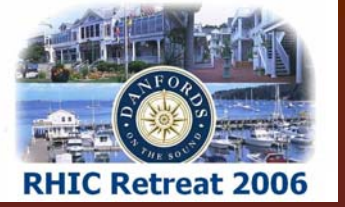


Increasing availability - 3

Optimization set-up and tuning

- Automation (emittance, beginning of store, collimation, polarization measurements). Planned at Retreat 2005, and during run preparation – *not yet fully implemented during Run-6*

→ *Talk by Greg this session*

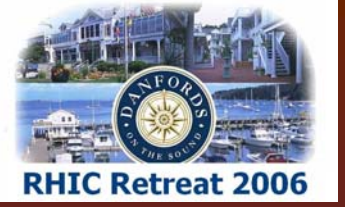


Increasing availability - 4

Online tools and analysis

- Online analysis tools can provide continuous failure tracking for trending and analysis during the running period.
- Responsible personnel from all groups will be able to identify creeping system failure issues early, thereby allowing corrections to be implemented sooner than in the past
- Monitoring using the online can also provide straightforward methods for determining the effectiveness of the corrective actions

→ *Talk by Rob this session*

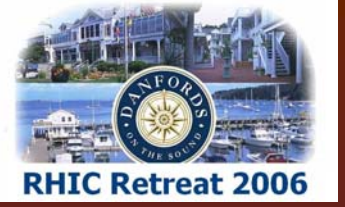


Increasing availability - 5

Human error

- human error has not only explicitly caused 30 failure hours in the last run but it is also a contributing factor behind many system failures
- Concerns all personnel involved in machine operations, not strictly the operations group

→ *Talk by Peter this session*



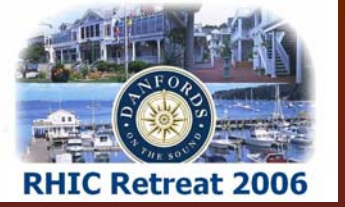
Increasing availability - 6

Operations integration

By integrating monitoring of operations in MCR (cryogenics, Siemens, CAS watches):

- Consolidation personnel
- Improved coordination and communication

  → improved recovery, set-up and tuning



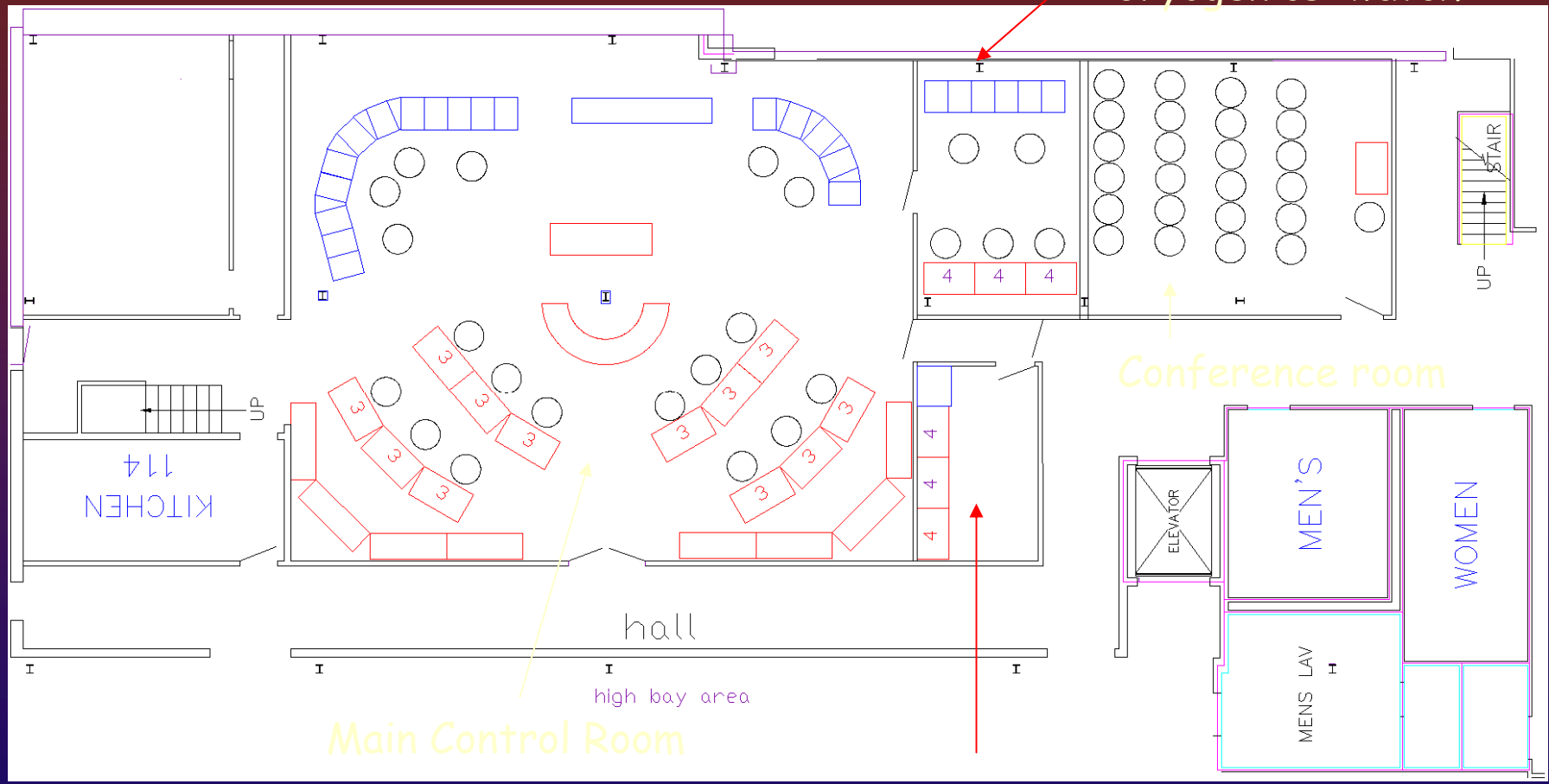
MCR Upgrade: motivations

- Create space for operations integration (next slide)
- Increase space for existing operations (Injectors, NSRL for NASA, RHIC program, BLIP operations)
- Prepare for planned RHIC upgrades (EBIS, ERL, RHIC-II, eRHIC)
- Creating a better working environment for personnel on shift, ergonomics and safety(→ help in staff recruitment and retention)
- Make MCR a showcase for the Laboratory (funding agencies, visitors, community)
- Free office space by creating a place for the operations group

In line with overall emphasis/plans at BNL on improvement of infrastructure

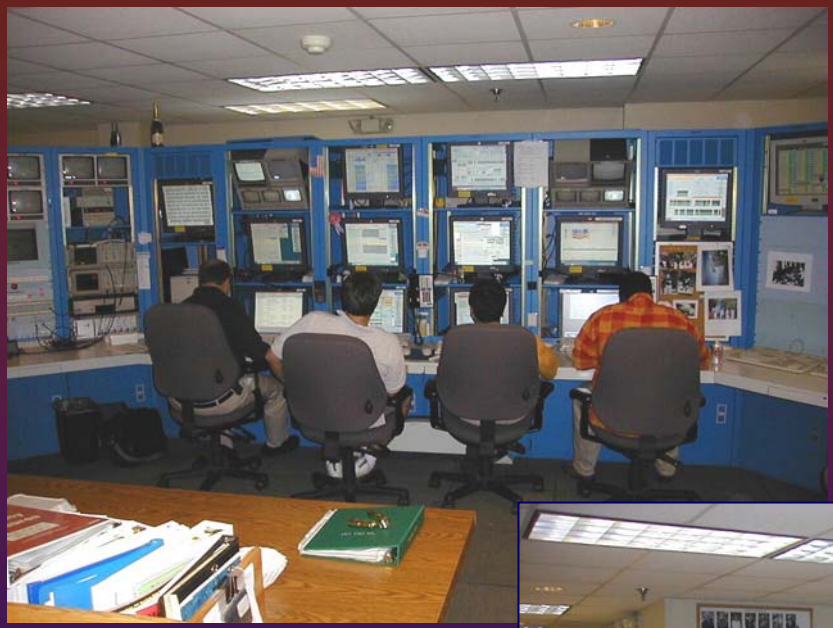
RHIC Retreat 2006

The new MCR proposal

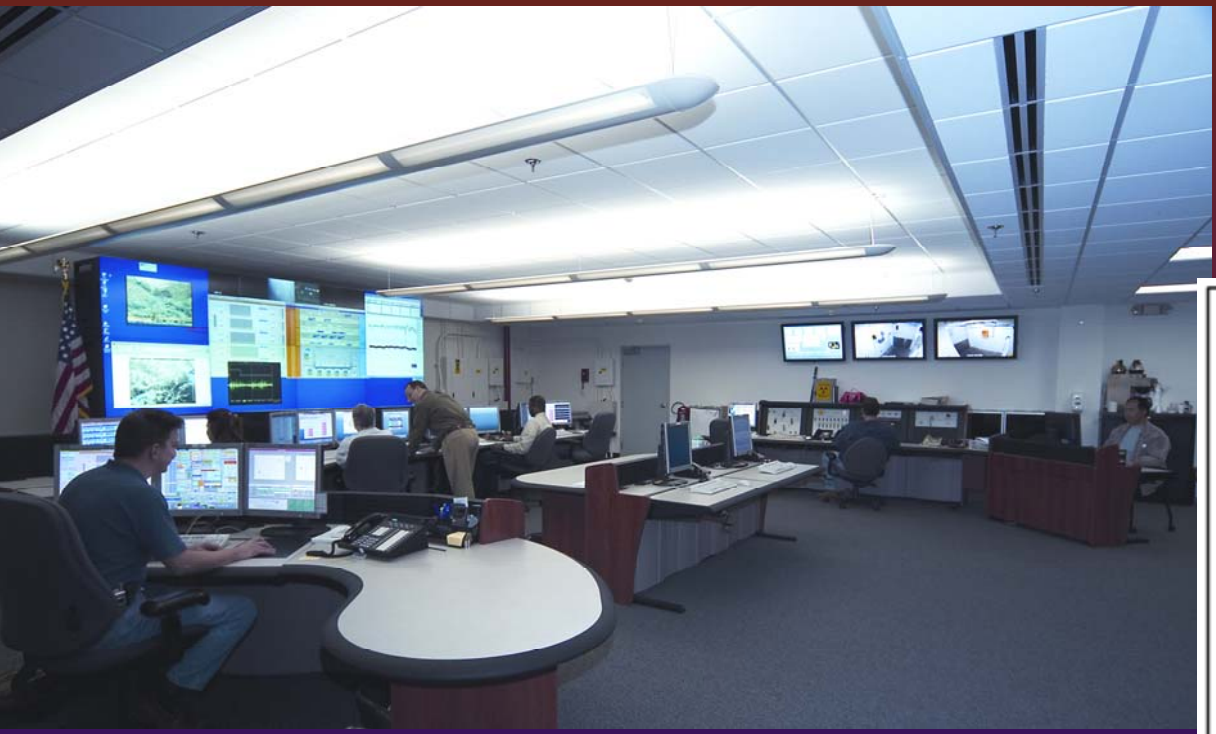


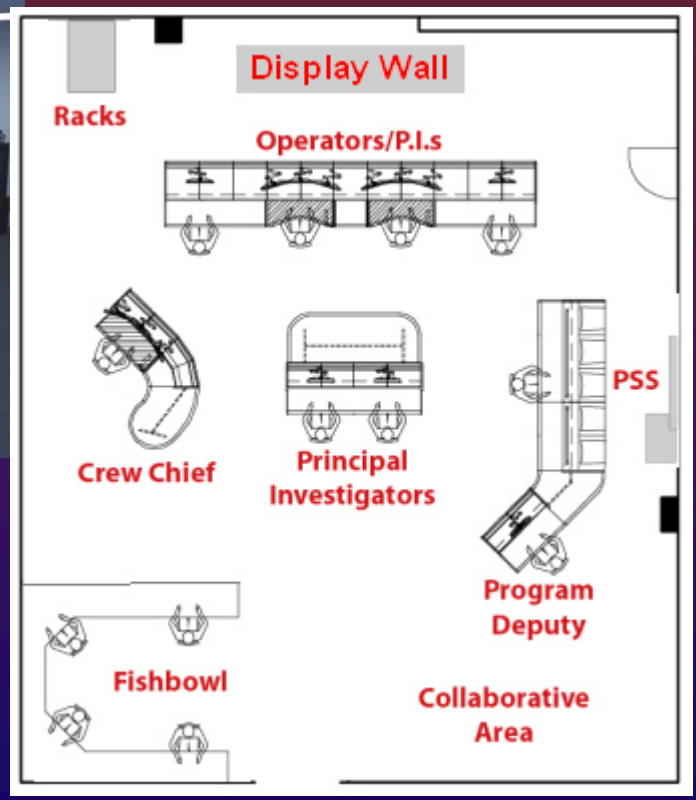
Software support

JLAB CR upgrade: before

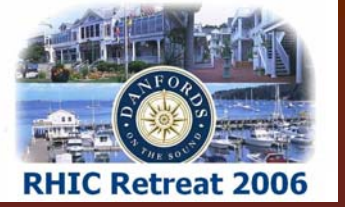


JLAB CR Upgrade: after





Significant installation work done by JLAB ops staff



After the Retreat

- Discuss systems and techniques at the Retreat
- Review of proposals from the systems
- Specific plan for higher availability (cost and schedule)
- Commitment to run Au-Au with a firm availability goal
- Monitoring progress (sub task force in ERTAF + preparation for next run)